

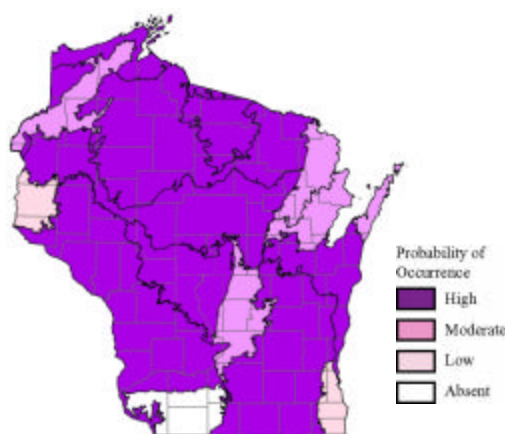
### 3.1.4.3 Individual Herptile Species of Greatest Conservation Need Summaries

## Four-toed Salamander (*Hemidactylium scutatum*)

### Species Assessment Scores\*

State rarity:	3
State threats:	3.5
State population trend:	3.5
Global abundance:	3
Global distribution:	4
Global threats:	4
Global population trend:	4
Mean Risk Score:	3.6
Area of importance:	3

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Central Lake Michigan Coastal	Great Lakes Ridge and Swale
Central Sand Plains	Alder thicket
Central Sand Plains	Floodplain forest
Central Sand Plains	Open bog
Central Sand Plains	Shrub-carr
Forest Transition	Northern mesic forest
Forest Transition	Northern wet-mesic forest
North Central Forest	Alder thicket
North Central Forest	Emergent marsh
North Central Forest	Ephemeral pond
North Central Forest	Northern mesic forest
North Central Forest	Northern wet-mesic forest
North Central Forest	Open bog
Northern Highland	Emergent marsh
Northern Highland	Open bog
Northwest Lowlands	Open bog
Southeast Glacial Plains	Bog relict
Southeast Glacial Plains	Emergent marsh
Southeast Glacial Plains	Floodplain forest
Southeast Glacial Plains	Shrub-carr
Southeast Glacial Plains	Southern hardwood swamp
Superior Coastal Plain	Emergent marsh
Superior Coastal Plain	Open bog
Superior Coastal Plain	Shore fen
Western Coulee and Ridges	Emergent marsh
Western Coulee and Ridges	Floodplain forest
Western Coulee and Ridges	Shrub-carr
Western Coulee and Ridges	Southern mesic forest

### **Threats and Issues**

- The predicted climate changes toward a warmer, drier climate would not favor this species, which is very sensitive to climate change as it has poor mobility.
- Loss of forest cover around breeding wetlands (ephemeral or permanent fishless wetlands with dense moss along edges or on overlain downed woody debris) degrades foraging habitat for this species.
- Forest harvesting or other disturbances that remove all or most of the forest canopy can depress local populations.
- Conversion of mixed forest to conifer plantations is a threat to this species.
- The loss of downed woody debris, or management that reduces the future quantity and quality of downed woody debris, can degrade habitat for this species.
- Invasive earthworms reduce habitat quality by reducing the amount and quality of duff, which is both direct habitat for and supports the prey base of these salamanders.
- Changing soil acidity and road salt probably impact this species, but no data are available to evaluate these issues.
- Roads contribute to habitat fragmentation and road mortality.

### **Priority Conservation Actions**

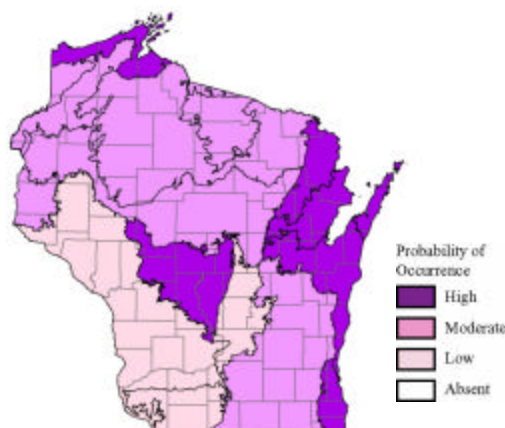
- Maintain old forests with vernal pools on both public and private lands to benefit this species.
- Forest management including a buffer around suitable forested wetlands habitats prevents premature pond drying and the loss of critical moss microhabitat (minimum of a 50-foot buffer).
- Management for quality and quantity of downed woody debris.
- Management guidelines for vernal pools within a forested matrix are needed to protect this species.
- Promote reforestation.
- Better protect vernal pools with adequate surrounding core habitat (700 ft).
- Wildlife habitat in general is poorly represented in zoning and planning and major strides are needed in policy and education here.
- Research is needed on impacts and control of non-native earthworms, and on potential impacts of changing soil acidity and road salt on this species.
- Inventory efforts are needed for vernal pool habitats.
- Educate public and government officials about vernal pools and associated core terrestrial habitat wildlife needs.
- Establish long term monitoring to track population trends of this species.
- Tax incentives are needed for preserving old growth forests, providing for reforestation, and preserving core habitat around vernal pools.

## Mudpuppy (*Necturus maculosus*)

### Species Assessment Scores\*

State rarity:	2
State threats:	3
State population trend:	4
Global abundance:	2
Global distribution:	4
Global threats:	3
Global population trend:	4
Mean Risk Score:	3.1
Area of importance:	3

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

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### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Central Lake Michigan Coastal	Lake Michigan
Central Lake Michigan Coastal	Warmwater rivers
Central Sand Plains	Impoundments/Reservoirs
Central Sand Plains	Warmwater rivers
Forest Transition	Impoundments/Reservoirs
Forest Transition	Warmwater rivers
North Central Forest	Impoundments/Reservoirs
North Central Forest	Inland lakes
North Central Forest	Warmwater rivers
Northeast Sands	Coldwater streams
Northeast Sands	Impoundments/Reservoirs
Northeast Sands	Inland lakes
Northeast Sands	Warmwater rivers
Northern Highland	Inland lakes
Northern Highland	Warmwater rivers
Northern Lake Michigan Coastal	Impoundments/Reservoirs
Northern Lake Michigan Coastal	Inland lakes
Northern Lake Michigan Coastal	Lake Michigan
Northern Lake Michigan Coastal	Warmwater rivers
Northwest Lowlands	Warmwater rivers
Northwest Sands	Inland lakes
Northwest Sands	Warmwater rivers
Southeast Glacial Plains	Impoundments/Reservoirs
Southeast Glacial Plains	Inland lakes
Southeast Glacial Plains	Warmwater rivers
Southern Lake Michigan Coastal	Impoundments/Reservoirs
Southern Lake Michigan Coastal	Inland lakes
Southern Lake Michigan Coastal	Lake Michigan
Southern Lake Michigan Coastal	Warmwater rivers
Superior Coastal Plain	Coldwater streams
Superior Coastal Plain	Lake Superior

Ecological Landscape	Community
Superior Coastal Plain	Warmwater rivers
Western Prairie	Warmwater rivers

### Threats and Issues

- Dams are barriers to upstream migration for this species.
- More research is needed to determine the extent to which dams may result in isolation and potential long-term genetic stagnation for this species.
- Excessive sediments and associated turbidity have buried rock structure and reduced plant beds in some rivers, reducing essential nesting habitats and cover for adult and juvenile mudpuppies.
- Evidence suggests that commercial exploitation of this species may be harming some populations.
- The introduction of the sea lamprey has resulted in the reduction of mudpuppy densities in river stretches associated with the Great Lakes that are treated with TFM (a chemical used to kill sea lamprey larvae in streams).
- TFM lampricide indiscriminately kills juvenile and adult mudpuppies and has been shown to cause local population declines where used. Long-term effects of multiple treatments may cause significant population declines unless source populations can emigrate to repopulate treated stretches of rivers.
- Invasive aquatic animals such as zebra mussels and bythotrephes change productivity pathways and food web dynamics of aquatic systems, probably reducing food supply and quality for mudpuppies.
- This species appears to be negatively affected by excessive Biological Oxygen Demand (BOD) or other pollutants. This salamander has been nearly or completely eliminated from streams with a history of water quality abuse. The Sheboygan River is an example.
- Scientific research has created a major demand for specimens from the biological supply industry.

### Priority Conservation Actions

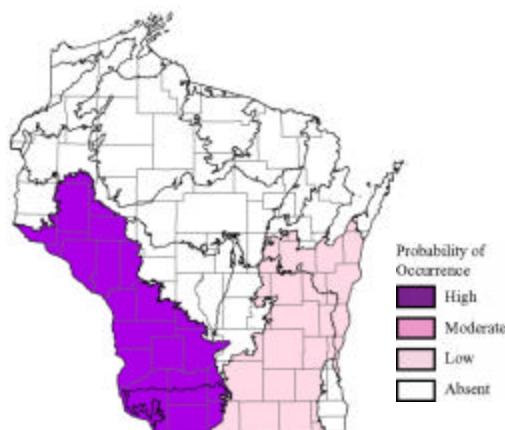
- Permanent protection of shorelines and buffers would benefit the species throughout its range.
- Restoration of instream habitat, along with watershed and shoreline protection efforts, would benefit this species.
- Harvest records need to be tracked to evaluate commercial trends.
- Changes in regulations may be needed depending on harvest levels and population trends.
- Major strides in policy and education are needed to ensure that wildlife habitat is represented and considered in zoning and planning decisions.
- Fisheries policy needs to better account for mudpuppy habitat and ecology.
- Research is needed to determine the long term effects of TFM on mudpuppy populations, and to develop sea lamprey-specific control methods that do not harm mudpuppies.
- Education is needed to dispel common misconceptions about the species, such as that mudpuppies are poisonous, that mudpuppies are detrimental to game fish, and that mudpuppies should be killed.
- Long term monitoring is needed to evaluate population status and track trends of representative populations.
- Better coordination between fisheries and wildlife agencies would improve mudpuppy monitoring, research and management efforts.
- The **spectaclecase and salamander mussels** are also Species of Greatest Conservation Need. Because the juvenile stages of these mussels use the mudpuppy as a host, actions taken to preserve the mudpuppy may aid conservation of spectaclecase and salamander mussel populations.

## Blanchard's Cricket Frog (*Acris crepitans blanchardi*)

### Species Assessment Scores\*

State rarity:	5
State threats:	4
State population trend:	5
Global abundance:	1
Global distribution:	3
Global threats:	3.5
Global population trend:	4
Mean Risk Score:	3.6
Area of importance:	2

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Central Lake Michigan Coastal	Warmwater rivers
Southwest Savanna	Coldwater streams
Southwest Savanna	Coolwater streams
Southwest Savanna	Warmwater streams
Western Coulee and Ridges	Coldwater streams
Western Coulee and Ridges	Coolwater streams
Western Coulee and Ridges	Emergent marsh
Western Coulee and Ridges	Southern sedge meadow
Western Coulee and Ridges	Submergent marsh
Western Coulee and Ridges	Warmwater rivers
Western Coulee and Ridges	Wet prairie

### Threats and Issues

- Research is ongoing to determine the potential impacts of climate on the decline of cricket frogs at the northern fringe of their range. Most experts feel the decline is at least partially attributable to harsh winters (extreme cold and little snow fall) from the 1950's through the mid-1980's, coupled with land use changes that prevent recolonization of ponds and normal metapopulation interactions.
- Agricultural run-off causing turbidity, eutrophication and sedimentation degrades habitat for this species.
- Natural succession to a more closed canopy forest appears to reduce or eliminate this species.
- Shoreline development degrades or eliminates habitat for this species.
- Moderate to intensive grazing can cause extensive shoreline disturbance and impact turbidity.
- Alterations of aquatic habitats may favor increasing pathogen (trematodes) vectors such as snails, resulting in an increased incidence of malformations, potentially affecting recruitment rates.
- Possible bullfrog predation in areas where it has been introduced or has invaded.

- Cricket frogs, being generally restricted to aquatic habitats, may be especially sensitive to pollutants entering the water. Runoff of pesticides, like atrazine, may threaten frogs directly by killing eggs, larvae, or adults. Indirect effects of pesticides may include alterations in behavior (frogs are less able to escape predators) and changes in the food base (invertebrates are killed by pesticides). Contaminants may also alter sex ratios of amphibians, resulting in reduced reproductive success.
- Poor water quality in general (e.g., low dissolved oxygen) may be a limiting factor for cricket frogs, which seem to be especially sensitive to this.
- Water quality and disease factors are thought to be causing malformations, and may be affecting reproductive success.
- A variety of pollution problems may be factors, including mercury, acid rain, salt, and nutrient loading (especially nitrates).
- A short life span and limited dispersal capability may make this species more vulnerable to local extinctions.

#### **Priority Conservation Actions**

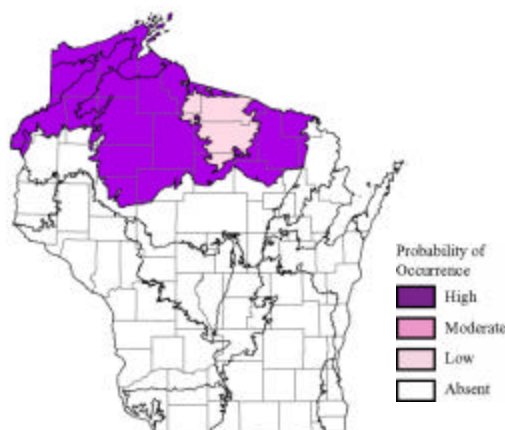
- Long term monitoring is needed to evaluate population status and track trends of representative populations. The annual frog and toad survey is not sufficient.
- Preserve habitat for known populations through long term land protection.
- Implement streambank protection programs to restore and insure long-term maintenance of bank buffers.
- Work with Conservation Reserve Enhancement Program, Wetlands Reserve Program and other landowner incentive programs to restore and create wetlands (ponds) along occupied stream corridors to increase breeding habitat.
- Reintroductions may be appropriate following habitat restoration or creation.
- Wildlife habitat in general is poorly represented in zoning and planning, and major strides are needed in policy and education here. This is especially important for this short-lived species, which may need functional landscape connectivity intact to preserve metapopulation interactions..
- Continued research on grazing and impacts of other farming practices is needed to achieve more ecologically sound farming practices.
- Research is needed to better understand specific life history parameters, such as identifying the microhabitats used for overwintering, to determine how metapopulation dynamics may be influencing the distribution and status of this species in Wisconsin, and to help us understand the causes of declines.
- Education and outreach efforts, focused on landowners and farmers living where the frogs occur, are needed to improve the long-term sustainability of populations.

## Boreal Chorus Frog (*Pseudacris maculata*)

### Species Assessment Scores\*

State rarity:	2
State threats:	3
State population trend:	3
Global abundance:	2
Global distribution:	4
Global threats:	3
Global population trend:	3
Mean Risk Score:	2.9
Area of importance:	2

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

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### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
North Central Forest	Emergent marsh
North Central Forest	Ephemeral pond
North Central Forest	Impoundments/Reservoirs
North Central Forest	Inland lakes
North Central Forest	Northern sedge meadow
North Central Forest	Open bog
Northwest Lowlands	Northern sedge meadow
Northwest Lowlands	Open bog
Northwest Sands	Emergent marsh
Northwest Sands	Inland lakes
Northwest Sands	Northern sedge meadow
Northwest Sands	Open bog
Northwest Sands	Pine barrens
Superior Coastal Plain	Emergent marsh
Superior Coastal Plain	Interdunal wetland
Superior Coastal Plain	Open bog

### Threats and Issues

- Net impacts of climate change are unclear for this species.
- Continuing development in the north is reducing habitat for this species.
- Invasive plants (e.g., reed canary grass, giant reed grass) are negatively impacting breeding habitat for this species.
- Road salt may be impacting breeding success in wetlands adjacent to roads.
- A variety of other pollution problems may be affecting breeding habitat including mercury, acid rain, and nutrient loads.

- Road densities and traffic are increasing within the range of this species, and studies indicate that frog populations are negatively impacted when breeding wetlands are adjacent to heavily traveled roads.

**Priority Conservation Actions**

- Preserve and protect shallow, fishless and ephemeral wetlands, and adjacent grassland or other open habitats.
- Maintain or restore natural grassland habitats on publicly-owned lands.
- Protect northern sedge meadows from encroachment by invasive plants.
- Major strides in policy and education are needed to adequately represent and protect wildlife habitat in zoning and planning decisions.
- Increased education efforts are needed to help the general public understand the correlation between habitat quality and species health.
- Basic research is needed to delineate this species' range and status and to determine whether or not a hybrid zone exists with the western chorus frog.
- Increased economic incentives are needed to promote preservation of northern sedge meadows and grasslands.

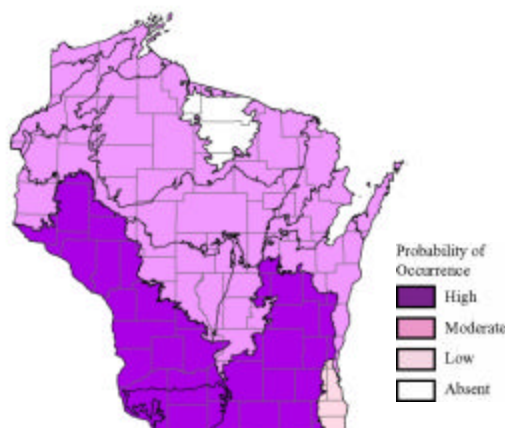


## Pickerel Frog (*Rana palustris*)

### Species Assessment Scores\*

State rarity:	3
State threats:	3
State population trend:	3
Global abundance:	4
Global distribution:	4
Global threats:	4
Global population trend:	3
Mean Risk Score:	3.4
Area of importance:	2

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### Ecological Landscape Associations

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### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Southeast Glacial Plains	Emergent marsh
Southeast Glacial Plains	Impoundments/Reservoirs
Southeast Glacial Plains	Southern sedge meadow
Southeast Glacial Plains	Warmwater rivers
Southeast Glacial Plains	Warmwater streams
Southeast Glacial Plains	Wet-mesic prairie
Southwest Savanna	Warmwater streams
Western Coulee and Ridges	Coldwater streams
Western Coulee and Ridges	Coolwater streams
Western Coulee and Ridges	Emergent marsh
Western Coulee and Ridges	Submergent marsh
Western Coulee and Ridges	Warmwater rivers

### Threats and Issues

- The potential net impacts of climate change, including increased stream temperatures and reduced precipitation, are probably negatives for this species.
- Riparian, shoreline and instream habitat disturbance and degradation caused by agricultural run-off, increased impervious surfaces, and intensive grazing threaten this species.
- The loss of vegetated shoreline caused by past sedimentation and subsequent streambank erosion (cutting and sloughing) is a threat to pickerel frogs. This is particularly notable in the driftless area where this frog would naturally be most abundant because of its affinity to cold water streams.
- Stream warming, resulting from reduced groundwater infiltration (related to intensive hillside grazing), and loss of stream miles are threats to pickerel frogs..
- Non-native invasive plants such as reed canary grass and giant reed grass decrease shoreline habitat suitability.

- Non-point source pollution increases turbidity, which is negatively correlated with some other stream dwelling frogs. This may be particularly important to pickerel frogs, which appear more reliant on clear water than any other Wisconsin frog.
- A variety of other pollutants may also have negative impacts on this species or its habitat, including mercury, acid rain, and road salt.

**Priority Conservation Actions**

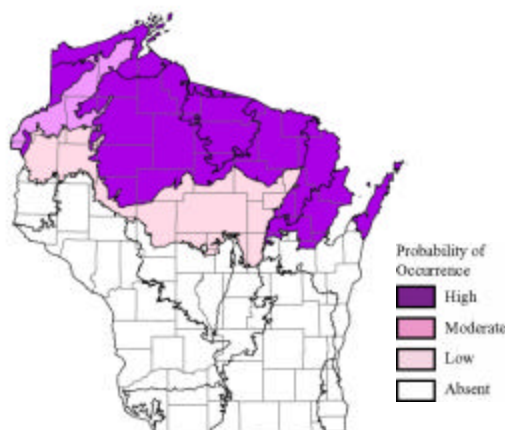
- Permanent protection of lands supporting several viable populations of this species is needed.
- Long term protection and preservation of shorelines and buffers is needed throughout the range of this species.
- Protect riparian habitats, restore shoreline buffers and exclude cattle from streams/streambanks and adjacent breeding wetlands.
- Restore habitat connectivity between streams and breeding wetlands, which may be more than 100 meters from a stream.
- Laws are needed requiring the exclusion of livestock from streams.
- Increased protection of shoreline habitat through more restrictive shoreland zoning ordinances is needed.
- Major strides in policy and education efforts are needed to ensure that wildlife habitat is adequately represented and considered in zoning and planning decisions.
- Increased efforts are needed to educate the agricultural community about water quality, including benefits of healthy waters for both people and wildlife.
- Long term monitoring is needed to evaluate population status and track trends of representative populations.
- Continue and increase funding for landowner incentive programs that promote improved shoreline, riparian, and wetland habitats.
- Continue to coordinate project reviews and continue training efforts with Natural Resources Conservation Service staff and other land conservation organizations.

## Mink Frog (*Rana septentrionalis*)

### Species Assessment Scores\*

State rarity:	2
State threats:	3
State population trend:	4
Global abundance:	3
Global distribution:	4
Global threats:	3
Global population trend:	4
Mean Risk Score:	3.3
Area of importance:	3

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### Ecological Landscape Associations

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### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
North Central Forest	Coolwater streams
North Central Forest	Emergent marsh
North Central Forest	Impoundments/Reservoirs
North Central Forest	Inland lakes
North Central Forest	Northern sedge meadow
North Central Forest	Open bog
North Central Forest	Submergent marsh
North Central Forest	Warmwater rivers
North Central Forest	Warmwater streams
Northeast Sands	Coolwater streams
Northeast Sands	Warmwater rivers
Northern Highland	Coolwater streams
Northern Highland	Emergent marsh
Northern Highland	Inland lakes
Northern Highland	Northern sedge meadow
Northern Highland	Open bog
Northern Highland	Submergent marsh
Northern Highland	Warmwater rivers
Northern Highland	Warmwater streams
Northern Lake Michigan Coastal	Emergent marsh
Northern Lake Michigan Coastal	Northern sedge meadow
Northern Lake Michigan Coastal	Warmwater rivers
Northern Lake Michigan Coastal	Warmwater streams
Northwest Lowlands	Northern sedge meadow
Northwest Lowlands	Open bog
Northwest Lowlands	Warmwater rivers
Superior Coastal Plain	Coolwater streams
Superior Coastal Plain	Emergent marsh
Superior Coastal Plain	Open bog
Superior Coastal Plain	Submergent marsh
Superior Coastal Plain	Warmwater streams

### **Threats and Issues**

- Net impacts of climate change are probably negative for this species, as competing species (green frogs, bullfrogs) are likely to advance further into mink frog range, and mink frog embryos have limited tolerance to warmer water temperatures and consequent lower oxygen diffusion rates.
- Shoreline development is reducing habitat for mink frogs, and likely creating increased competition with green frogs and bullfrogs along remaining undeveloped or undevelopable shorelines.
- Bullfrogs may be invasive competitors in many mink frog lakes.
- Invasive plants such as reed canary grass and giant reed grass can negatively impact shoreline habitat suitability.
- Invasive aquatic animals such as zebra mussels and bythotrephes change productivity pathways and food web dynamics of aquatic systems.
- Northern lakes are suffering from a variety of pollution problems including mercury, acid rain, salt, nutrient loads, and (where motorized traffic is heavy) fossil fuel spillage.
- Mink frog malformations have been documented in multiple years in a Bayfield County lake. More research is needed to determine whether malformations are impacting populations and what is causing malformations in this species
- Motorized watercraft are reducing water quality and increasing wave action impacts in shoreline habitats.

### **Priority Conservation Actions**

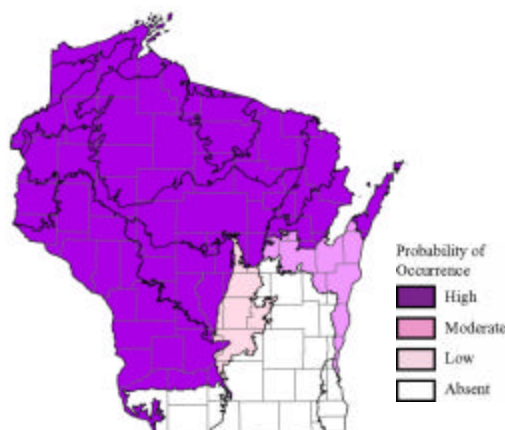
- Restoration and permanent protection of shorelines and buffers is needed throughout the range, especially where significant shoreline development has compromised populations.
- More efforts are needed to control wetland and aquatic non-native invasive plants and animals to reduce negative impacts on this species and its habitat.
- More protective shoreland zoning ordinances are needed to protect enough significant natural shoreline and buffer to avoid compromising their associated wildlife and aquatic resource values.
- Major strides are needed in policy and education to more adequately represent and protect wildlife habitat in zoning and planning decisions.
- Continuing education is needed to provide riparian landowners with land management and use alternatives that are resource-friendly.
- Long term monitoring is needed to evaluate population status and track trends of representative populations.
- Research on the competitive interactions of mink frogs, green frogs, and bullfrogs is needed.
- Continue to work with river and lake associations and other conservation organizations to promote shoreline protection.

## Wood Turtle (*Glyptemys insculpta*)

### Species Assessment Scores\*

State rarity:	3
State threats:	4
State population trend:	4.5
Global abundance:	4
Global distribution:	5
Global threats:	4
Global population trend:	4
Mean Risk Score:	4.1
Area of importance:	3

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### Ecological Landscape Associations

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### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Central Sand Plains	Alder thicket
Central Sand Plains	Floodplain forest
Central Sand Plains	Oak barrens
Central Sand Plains	Pine barrens
Central Sand Plains	Sand prairie
Central Sand Plains	Shrub-carr
Forest Transition	Coldwater streams
Forest Transition	Coolwater streams
Forest Transition	Northern mesic forest
Forest Transition	Warmwater rivers
Forest Transition	Warmwater streams
North Central Forest	Alder thicket
North Central Forest	Coldwater streams
North Central Forest	Coolwater streams
North Central Forest	Northern mesic forest
North Central Forest	Submergent marsh
North Central Forest	Warmwater rivers
North Central Forest	Warmwater streams
Northeast Sands	Bracken grassland
Northeast Sands	Coldwater streams
Northeast Sands	Coolwater streams
Northeast Sands	Pine barrens
Northeast Sands	Warmwater rivers
Northern Highland	Coolwater streams
Northern Highland	Submergent marsh
Northern Highland	Warmwater rivers
Northern Highland	Warmwater streams
Northern Lake Michigan Coastal	Northern mesic forest
Northern Lake Michigan Coastal	Shrub-carr
Northern Lake Michigan Coastal	Warmwater rivers
Northern Lake Michigan Coastal	Warmwater streams

Ecological Landscape	Community
Northwest Lowlands	Warmwater rivers
Northwest Sands	Coldwater streams
Northwest Sands	Coolwater streams
Northwest Sands	Pine barrens
Northwest Sands	Submergent marsh
Northwest Sands	Warmwater rivers
Superior Coastal Plain	Coldwater streams
Superior Coastal Plain	Coolwater streams
Superior Coastal Plain	Great lakes barrens
Superior Coastal Plain	Submergent marsh
Superior Coastal Plain	Warmwater streams
Western Coulee and Ridges	Coldwater streams
Western Coulee and Ridges	Coolwater streams
Western Coulee and Ridges	Dry prairie
Western Coulee and Ridges	Floodplain forest
Western Coulee and Ridges	Oak barrens
Western Coulee and Ridges	Sand prairie
Western Coulee and Ridges	Shrub-carr
Western Coulee and Ridges	Submergent marsh
Western Coulee and Ridges	Warmwater rivers
Western Prairie	Coldwater streams
Western Prairie	Coolwater streams
Western Prairie	Warmwater rivers
Western Prairie	Warmwater streams

### Threats and Issues

- Dams can impede natural erosion and deposition processes in streams and negatively impact nesting opportunities by stabilizing banks and sand bars.
- Habitat loss and degradation from shoreline and other development in riparian corridors are a threat to this species.
- Clear cutting and development within 50 meters of streams can damage primary habitat and stream water quality.
- Over-collecting prior to Threatened-species designation and poaching appear to be locally significant sources of mortality.
- Invasive plants such as reed canary grass and giant reed grass may decrease shoreline habitat suitability.
- Invasive aquatic animals such as zebra mussels and bythotrephes change productivity pathways and food web dynamics in aquatic systems.
- A variety of potential problems related to water quality and aquatic invertebrate communities are poorly studied. Mercury, acid rain, road salt, and nutrient loads could all impact wood turtle prey availability.
- Recreation can disturb nesting, especially trout fisherman and canoeists utilizing sand bars and eroded banks in June.
- Road mortality can be locally significant where nesting on or along sandy roads occurs.
- Increased nest predation rates for this communal denning species may be seriously limiting population maintenance and recovery, resulting from unnaturally high populations of human subsidized predators (coyotes, raccoons, skunks, fox, etc.).

**Priority Conservation Actions**

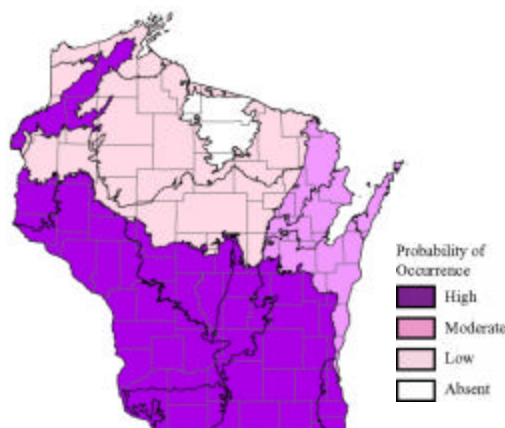
- Permanent protection of shorelines and buffers is needed throughout the range.
- Permanent protection of important communal breeding sites and surrounding habitat is needed.
- Minimize sediment pollution and pesticide loading throughout the watershed to improve aquatic habitats and water quality.
- Allow natural stream erosion and deposition processes to operate (which provide nesting sites), protect riparian buffer zones, and manage streams overall for best water quality practices.
- Wildlife habitat in general is poorly represented in zoning and planning and major strides are needed in policy and education here.
- Control recreational access to communal breeding sites during nesting season.
- Research is needed to determine effective ways to protect nests and improve recruitment rates.
- Education is needed where wood turtles are being harvested for food.
- Long term monitoring is needed to evaluate population status and track trends of representative populations. Nest site monitoring is the most feasible.
- Three general wood turtle conservation recommendations are: a) protect wood turtles from exploitation (for food, biological supply, and pets); b) accurately determine and monitor distribution and status, especially of nest areas; and c) incorporate wood turtle habitat needs into other management plans (fisheries, forestry, river management; Buech 1995). See Buech and Nelson (1997) for further detailed recommendations.

## Blanding's Turtle (*Emydoidea blandingii*)

### Species Assessment Scores\*

State rarity:	3
State threats:	3.5
State population trend:	4
Global abundance:	4
Global distribution:	5
Global threats:	3.5
Global population trend:	4
Mean Risk Score:	3.9
Area of importance:	4

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Central Sand Hills	Emergent marsh
Central Sand Hills	Impoundments/Reservoirs
Central Sand Hills	Inland lakes
Central Sand Plains	Impoundments/Reservoirs
Central Sand Plains	Oak barrens
Central Sand Plains	Pine barrens
Central Sand Plains	Sand prairie
Northwest Sands	Emergent marsh
Northwest Sands	Emergent marsh - wild rice
Northwest Sands	Inland lakes
Northwest Sands	Pine barrens
Northwest Sands	Submergent marsh
Southeast Glacial Plains	Dry prairie
Southeast Glacial Plains	Emergent marsh
Southeast Glacial Plains	Impoundments/Reservoirs
Southeast Glacial Plains	Inland lakes
Southeast Glacial Plains	Oak opening
Southwest Savanna	Dry prairie
Southwest Savanna	Oak opening
Western Coulee and Ridges	Dry prairie
Western Coulee and Ridges	Emergent marsh
Western Coulee and Ridges	Oak barrens
Western Coulee and Ridges	Oak opening
Western Coulee and Ridges	Sand prairie
Western Coulee and Ridges	Submergent marsh
Western Prairie	Emergent marsh



### **Threats and Issues**

- Increases in nest predators associated with humans (coyotes, raccoons, skunks, etc.) may be significantly lowering nesting success.
- The predicted warmer and drier climate in Wisconsin would reduce wetland habitat, increase the active season, and may change competitive interactions with other turtles.
- Agriculture and urban sprawl have fragmented the landscape and increased traffic resulting in increased highway mortality, habitat loss, and lower recruitment rates (through loss of females and increased nest predation rates).
- Wetland losses and degradation (especially from invasive species) have lowered carrying capacity.
- Prescribed burns are known to cause mortality.
- Winter drawdowns are known to cause mortality.
- Stocking fish into natural wetlands without fish lowers the carrying capacity for turtles by reducing food resources. Blanding's are probably especially sensitive to fish stocking since they favor fishless wetlands.
- Invasive wetland plants such as reed canary grass and giant reed grass lower habitat quality and turtle carrying capacity.
- Pollution could very well be an issue for this long lived species that feeds in sediments, but there are no data available to evaluate this threat.

### **Priority Conservation Actions**

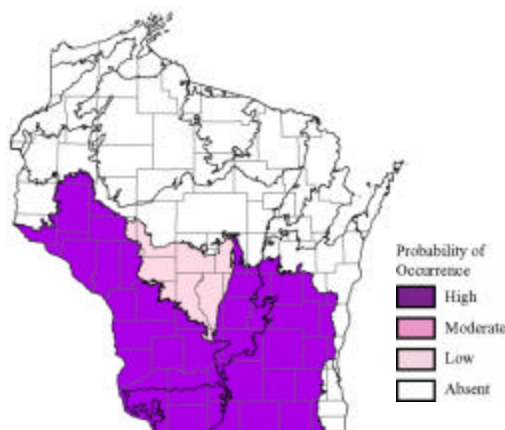
- Long term protection and management of essential habitats is needed. Habitats must be sufficiently large and complex to meet all habitat needs, and not fragmented by roads and development.
- Implement drawdown management timing policy on all affected waters where Department of Natural Resources approval is required.
- Restore drained wetlands.
- Restore connectivity and quality of nesting habitats.
- Consider head-starting (i.e., the captive rearing of wild-produced hatchlings that grows them to a point of significantly reduced predation rates, typically for 10 to 11 months immediately following hatching) where recruitment is compromised. Initiate research regarding the long-term effects of head-starting.
- Recommend the installation of permanent underpasses and/or barriers for highway projects where Blanding's mortality is believed to impact species recovery.
- Wildlife habitat in general is poorly represented in zoning and planning and major strides are needed in policy and education here.
- Long-term monitoring of several small and large populations statewide is needed to help document status and trends.
- Public education efforts about turtle mortalities along roads, including installing turtle crossing signs, are needed.
- Programs that provide economic incentives to landowners to restore wetland habitats, establish wetland buffers, and improve habitat connectivity should continue and expand.

## Ornate Box Turtle (*Terrapene ornata*)

### Species Assessment Scores\*

State rarity:	5
State threats:	5
State population trend:	5
Global abundance:	3
Global distribution:	4
Global threats:	3
Global population trend:	4
Mean Risk Score:	4.1
Area of importance:	2

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Central Sand Hills	Central sands pine-oak forest
Central Sand Hills	Southern dry forest
Southeast Glacial Plains	Dry prairie
Southeast Glacial Plains	Oak opening
Southeast Glacial Plains	Oak woodland
Southeast Glacial Plains	Southern dry forest
Southeast Glacial Plains	Southern dry-mesic forest
Southwest Savanna	Dry prairie
Southwest Savanna	Oak opening
Southwest Savanna	Oak woodland
Western Coulee and Ridges	Cedar glade
Western Coulee and Ridges	Dry prairie
Western Coulee and Ridges	Oak opening
Western Coulee and Ridges	Oak woodland
Western Coulee and Ridges	Sand prairie
Western Coulee and Ridges	Southern dry forest
Western Coulee and Ridges	Southern dry-mesic forest

### Threats and Issues

- Intentional killing may be an issue for this listed species, though it has only been documented once.
- The conversion of sand prairie to productive agricultural land as a result of irrigation systems is the greatest threat to this species in Wisconsin.
- Pine planting on sand prairies has reduced acreage of suitable habitat.
- Fire suppression has contributed to woody encroachment, reducing critical sand prairie nesting and overwintering habitat.
- Illegal collecting for pets has been documented as recently as the 1990's.

- Spotted knapweed, a non-native invasive plant, is a significant threat to native plant communities on several of the extant sites. The ramifications of this threat are not well understood, but it appears that it could significantly impact this turtle along with many dry/dry-mesic prairies and associated species.
- Motorized recreation may damage sensitive sand prairie habitats used by this species.
- Roads contribute to species decline through vehicle-induced mortality and habitat fragmentation.

**Priority Conservation Actions**

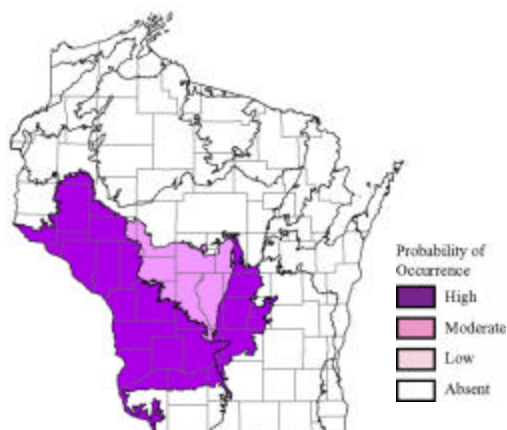
- Continue to permanently protect, manage and restore habitat on private lands within and adjacent to the St. Lawrence Prairie State Natural Area in Rock County and in other areas where remaining viable populations are known to occur.
- Continue head-starting program with five populations through at least 2012, and increase efforts to locate females at Rocky Run State Natural Area so that head-starting can begin there.
- Additional efforts are needed to control noxious invasive plants like spotted knapweed, sweet clover, and leafy spurge, which degrade habitat for this species.
- Major strides in policy and education efforts are needed to ensure that wildlife habitat is adequately represented and considered in zoning and planning decisions. This is especially important for this species which is very vulnerable to poor highway and development planning which might fragment habitats.
- Continued efforts are needed to educate landowners whose lands support Ornate box turtles.
- Long term monitoring is needed to evaluate population status and track trends of representative populations.
- A thorough scientific assessment of head starting programs is needed, along with research to determine why recruitment is low in this species so that recruitment problems can be addressed and head starting programs may eventually cease.
- Analyses are needed to determine the long term viability of extant populations.
- Continue and expand efforts to improve the efficiency and affordability of land management efforts, including hosting more landowner work parties.

## Midland Smooth Softshell Turtle (*Apalone mutica*)

### Species Assessment Scores\*

State rarity:	3
State threats:	3
State population trend:	3
Global abundance:	4
Global distribution:	4
Global threats:	3
Global population trend:	3
Mean Risk Score:	3.3
Area of importance:	3

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Central Sand Hills	Warmwater rivers
Central Sand Plains	Warmwater rivers
Western Coulee and Ridges	Warmwater rivers

### Threats and Issues

- Hydro-electric operations of dams on the Mississippi River are a threat to this species.
- Commercial fishing may be negatively impacting populations through incidental bi-catch in catfish traps and gill and trammel nets.
- Invasive aquatic animals such as zebra mussels and bythotrephes change productivity pathways and cascade throughout aquatic systems, probably reducing food supply and quality for this species.
- Chemical contaminants and siltation are likely affecting this aquatic species which forages in sediments as well as its prey base, but research is needed to learn more about specific impacts to the species.
- Sand bar camping and other recreation may be negatively impacting nesting.
- Excessive motorized and non-motorized recreation may affect foraging and basking behavior to the point of compromising energy budgets in some high use areas.
- Dams on the Mississippi River may limit genetic exchange, especially with populations upstream.
- Dams and dikes, loss of natural river deposition and erosion processes, and hydrologic manipulation all affect nesting habitat availability. These may have both positive and negative impacts and need to be addressed.
- Dredge spoil pile maintenance can negatively impact nesting success, especially when conducted during the period of June 1 through September 15.

**Priority Conservation Actions**

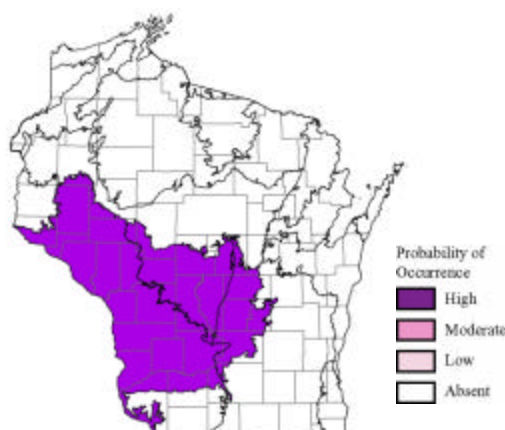
- Protection of shoreline habitat is needed, which also helps to improve water quality and reduce sediment and contaminant loads.
- Restoring natural stream processes of erosion and deposition may improve nesting success for this species.
- Work with the Army Corps of Engineers to implement policies for dealing with dredge spoil pile maintenance that are consistent with the results of needed research on the impacts of dredge spoil maintenance (off-loading) on turtle nesting. Policy changes should follow the testing of possible solutions to minimize impacts if they are found to be significant.
- Revise commercial fishing regulations, as needed, pending an evaluation of impacts of current levels of by-catch of this species.
- Research is needed to evaluate nesting success on islands, banks and dredge spoil piles in the Mississippi River.
- Long term monitoring is needed to evaluate population status and track trends of representative populations.
- Better coordination between fisheries and wildlife agencies would improve smooth softshell monitoring, research and management.

## Western Slender Glass Lizard (*Ophisaurus attenuatus*)

### Species Assessment Scores\*

State rarity:	5
State threats:	4
State population trend:	4
Global abundance:	4
Global distribution:	4
Global threats:	4
Global population trend:	3
Mean Risk Score:	4
Area of importance:	2

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Central Sand Hills	Dry prairie
Central Sand Hills	Oak barrens
Central Sand Hills	Pine barrens
Central Sand Hills	Sand prairie
Central Sand Plains	Dry prairie
Central Sand Plains	Dry-mesic prairie
Central Sand Plains	Oak barrens
Central Sand Plains	Pine barrens
Central Sand Plains	Sand prairie
Western Coulee and Ridges	Dry prairie
Western Coulee and Ridges	Dry-mesic prairie
Western Coulee and Ridges	Oak barrens
Western Coulee and Ridges	Oak opening
Western Coulee and Ridges	Pine barrens
Western Coulee and Ridges	Sand prairie

### Threats and Issues

- Habitat loss and fragmentation are major threats to this species. Causes include the past conversion of dry prairies and savannas to agriculture and pine plantations, and natural succession to oak woods.
- Spotted knapweed and other invasive plants are simplifying significant acreages of suitable habitat in the central sands of Wisconsin and may negatively affect invertebrate biomass and carrying capacity for the lizard.
- Paved roads are definite and significant barriers for this lizard as they are barely capable of locomotion on smooth surfaces. This results in population isolation and eventual loss depending on road densities and other habitat factors.

- Roadside mowing may cause significant mortality but is potentially important in maintaining open canopy along roadsides, which often serve as corridors between habitat patches.

**Priority Conservation Actions**

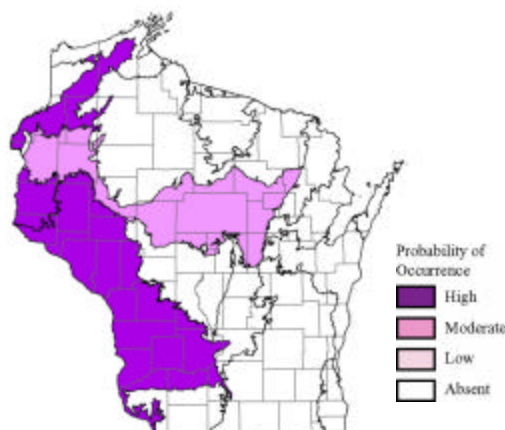
- Long term protection of suitable and restorable habitat within their range is needed. Low lizard biomass in Wisconsin suggests that large blocks of habitat are needed in order to insure long-term viability.
- Management and restoration of habitats, including creating corridor connections between suitable habitat patches, is needed.
- Roadside mowing policies are needed to minimize mortality (should include blade height, timing of day and year restrictions and mowing frequencies) along all suitable roadside habitats within their range.
- Major strides in policy and education are needed to ensure that wildlife habitat is adequately represented and considered in zoning and planning decisions.
- Significant education for town and county government mowing staff is needed to implement improved policies for roadside mowing.
- Educate private landowners on habitat management and mowing practices that would help this species.
- Long term monitoring is needed to evaluate population status and track trends of representative populations.
- Landowner incentive programs are needed to help restore and/or permanently protect suitable habitat on private lands.
- Partnerships with other groups are needed to most effectively protect and manage habitat for this species.

## Northern Prairie Skink (*Eumeces septentrionalis*)

### Species Assessment Scores\*

State rarity:	2
State threats:	3
State population trend:	3
Global abundance:	3
Global distribution:	5
Global threats:	3
Global population trend:	3
Mean Risk Score:	3.1
Area of importance:	3

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Northwest Sands	Northern dry forest
Northwest Sands	Northern dry-mesic forest
Northwest Sands	Pine barrens
Western Coulee and Ridges	Bedrock glade
Western Coulee and Ridges	Cedar glade
Western Coulee and Ridges	Dry cliff
Western Coulee and Ridges	Dry prairie
Western Coulee and Ridges	Dry-mesic prairie
Western Coulee and Ridges	Oak barrens
Western Coulee and Ridges	Oak opening
Western Coulee and Ridges	Oak woodland
Western Coulee and Ridges	Pine barrens
Western Coulee and Ridges	Sand prairie
Western Coulee and Ridges	Southern dry forest
Western Coulee and Ridges	Southern dry-mesic forest
Western Prairie	Bedrock glade
Western Prairie	Cedar glade
Western Prairie	Dry prairie
Western Prairie	Oak opening
Western Prairie	Sand prairie

### Threats and Issues

- Habitat degradation and loss from natural succession of sand prairies and barrens habitats threatens this species.
- Planting and maintenance of pine forests on sand prairie and barrens habitat is a threat to this species.
- Spotted knapweed, a non-native invasive plant, appears likely to indirectly impact this lizard through habitat simplification while limiting invertebrate biomass (its prey base).



- Motorized recreation may damage sensitive prairie and barrens habitats used by this species.
- Road building may fragment habitat and populations.

**Priority Conservation Actions**

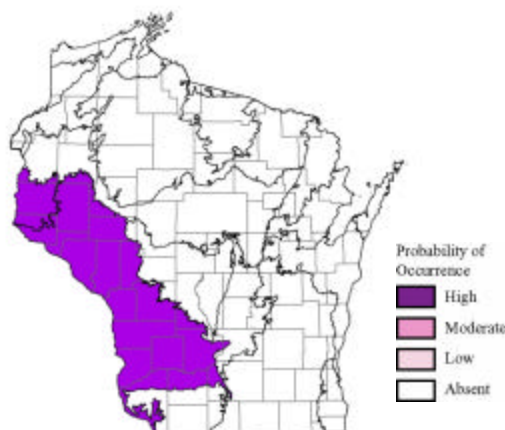
- Permanent protection of habitat adequate for maintaining several viable, major populations over the long term is needed.
- Land management is needed to increase suitable barrens habitat for this and other barrens-associated species.
- Additional efforts are needed to control invasive exotic plants like spotted knapweed.
- Land protection and management efforts benefiting this species could be included in the county forest 10-year planning process.
- Major strides in policy and education efforts are needed to ensure that wildlife habitat is adequately represented and considered in zoning and planning decisions.
- Landowner education efforts, including hands on workshops, are needed to promote barrens restoration and management.
- Long term monitoring is needed to evaluate population status and track trends of representative populations.
- Research is needed to find effective controls for spotted knapweed and other invasive exotic plants.

## Prairie Racerunner (*Cnemidophorus sexlineatus virdis*)

### Species Assessment Scores\*

State rarity:	3
State threats:	4
State population trend:	4
Global abundance:	3
Global distribution:	3
Global threats:	3
Global population trend:	3
Mean Risk Score:	3.3
Area of importance:	2

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

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### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Western Coulee and Ridges	Bedrock glade
Western Coulee and Ridges	Cedar glade
Western Coulee and Ridges	Dry prairie
Western Coulee and Ridges	Oak barrens
Western Coulee and Ridges	Oak opening
Western Coulee and Ridges	Sand prairie
Western Prairie	Bedrock glade
Western Prairie	Cedar glade
Western Prairie	Dry prairie
Western Prairie	Oak opening
Western Prairie	Sand prairie

### Threats and Issues

- Loss and degradation of sand prairie habitat to development, natural succession, and conversion to agriculture and pine plantations is a threat to this species.
- Habitat fragmentation may be causing genetic isolation of prairie racerunner populations.
- Spotted knapweed, a non-native invasive plant, is simplifying vegetative diversity in some occupied habitats and may be subsequently affecting cover quality and invertebrate diversity and biomass.
- Roads contribute to habitat fragmentation.

### Priority Conservation Actions

- Habitat management and restoration efforts are needed to set back natural succession in sand prairie habitats.
- Restore connectivity between isolated habitat patches to improve carrying capacity and improve genetic exchange.

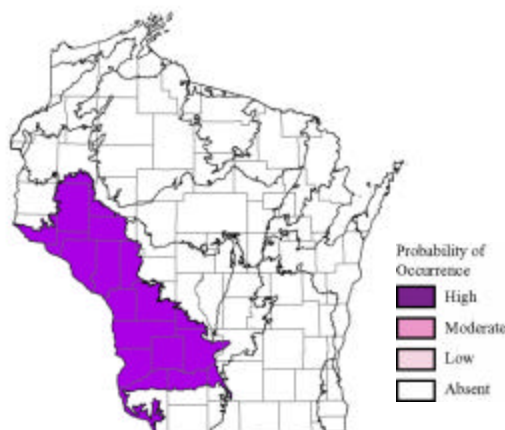
- Control spotted knapweed and other invasive plant species that alter or simplify habitat quality or prey availability.
- Partnerships with private landowners are needed to aid in species and habitat protection efforts.
- Long term monitoring is needed to evaluate population status and track trends of representative populations.
- Additional incentives are needed to preserve and restore the rare community type this and other species depend on.
- Partnerships with other groups and organizations are needed to more effectively manage and protect habitat for this species.

## Western Worm Snake (*Carphophis amoenus*)

### Species Assessment Scores\*

State rarity:	5
State threats:	3.5
State population trend:	3
Global abundance:	3
Global distribution:	4
Global threats:	3
Global population trend:	3
Mean Risk Score:	3.5
Area of importance:	1

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

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### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Western Coulee and Ridges	Cedar glade
Western Coulee and Ridges	Dry prairie
Western Coulee and Ridges	Southern dry forest
Western Coulee and Ridges	Southern dry-mesic forest

### Threats and Issues

- Habitat loss through natural succession may be contributing to the species' rarity in Wisconsin.
- Rarity itself is a threat to this species. Limited distribution (known from only one site) limits chances for long-term survival of this species in Wisconsin.

### Priority Conservation Actions

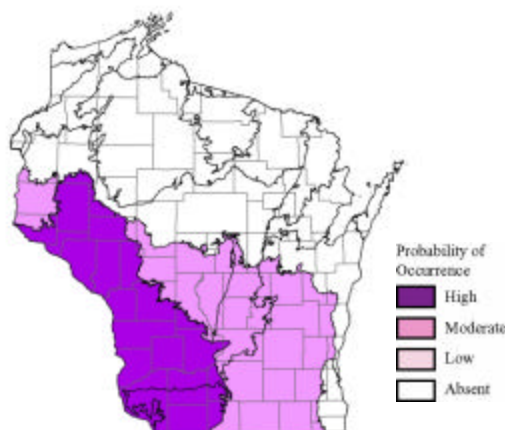
- As new sites are identified, they should be permanently protected.
- Take every precaution to protect, maintain and expand the microhabitat and general habitat area that is used by this snake at Nelson-Dewey State Park.
- Additional survey work is needed to better determine the status of this species in southwest Wisconsin.
- Work with park staff at Nelson-Dewey State Park to help them recognize suitable habitat for the species so they can protect, maintain and possibly expand habitat for the snake.
- Additional surveys in Grant County are needed to better document their distribution.
- Long term monitoring is needed to evaluate population status and track trends.

## Yellow-bellied Racer (*Coluber constrictor*)

### Species Assessment Scores\*

State rarity:	4
State threats:	4.5
State population trend:	5
Global abundance:	4
Global distribution:	2
Global threats:	3
Global population trend:	3
Mean Risk Score:	3.6
Area of importance:	2

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

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### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Central Sand Plains	Sand prairie
Southeast Glacial Plains	Dry prairie
Southwest Savanna	Dry prairie
Southwest Savanna	Dry-mesic prairie
Western Coulee and Ridges	Cedar glade
Western Coulee and Ridges	Dry cliff
Western Coulee and Ridges	Dry prairie
Western Coulee and Ridges	Dry-mesic prairie
Western Coulee and Ridges	Oak barrens
Western Coulee and Ridges	Sand prairie
Western Coulee and Ridges	Southern dry forest
Western Coulee and Ridges	Southern dry-mesic forest

### Threats and Issues

- Habitat loss and degradation from bluffland and other urban sprawl, conversion of sand prairie to agricultural land, and encroachment of red cedar and other woody debris into bluff and sand prairies (unchecked natural succession) threatens this species.
- Spotted knapweed, a non-native invasive plant, has the potential to reduce carrying capacity through habitat simplification that may impact rodent populations. This appears to be an imminent threat.
- Off-road vehicles can damage sensitive habitats and may cause direct mortality.
- Road building fragments habitats and increases road mortality.
- This species appears to be declining faster than we would expect given the habitat threats. This suggests that other unrecognized threats may exist.

**Priority Conservation Actions**

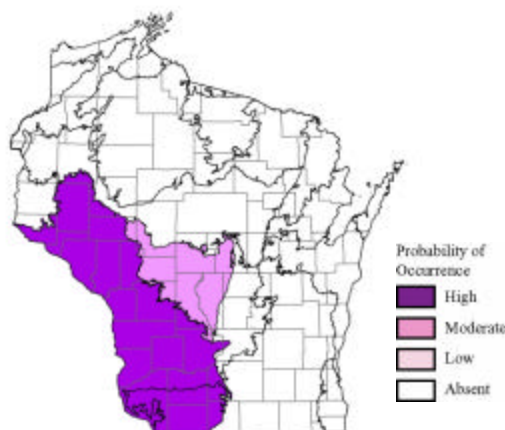
- Permanent protection of additional bluff and sand prairie habitat would benefit this species.
- Land management efforts to reverse the negative effects of natural succession on public and private lands is necessary to help stabilize and recover populations.
- Restore agricultural lands to suitable habitat as they are acquired and/or protected.
- Major strides in policy and education are needed to ensure that wildlife habitat is adequately represented and considered in zoning and planning decisions.
- Education of landowners is needed to accomplish habitat restoration work on private lands. One avenue for this is the rare snake workshops.
- Research is needed to identify other causes of decline.
- Long term monitoring is needed to evaluate population status and track trends of representative populations.
- Landowner incentive programs may help address management of appropriate habitats. Additional funding for these programs is needed.
- Partnering with prairie restoration groups like the Prairie Enthusiasts will help accomplish management more efficiently.
- Partner with universities and colleges to accomplish needed research and address conservation concerns.

## Prairie Ringneck Snake (*Diadophis punctatus arnyi*)

### Species Assessment Scores\*

State rarity:	3
State threats:	3.5
State population trend:	3
Global abundance:	2
Global distribution:	4
Global threats:	3
Global population trend:	3
Mean Risk Score:	3.1
Area of importance:	2

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Southwest Savanna	Dry prairie
Southwest Savanna	Dry-mesic prairie
Southwest Savanna	Oak opening
Southwest Savanna	Oak woodland
Western Coulee and Ridges	Bedrock glade
Western Coulee and Ridges	Cedar glade
Western Coulee and Ridges	Dry prairie
Western Coulee and Ridges	Dry-mesic prairie
Western Coulee and Ridges	Oak barrens
Western Coulee and Ridges	Oak opening
Western Coulee and Ridges	Oak woodland
Western Coulee and Ridges	Sand prairie
Western Coulee and Ridges	Southern dry forest
Western Coulee and Ridges	Southern dry-mesic forest

### Threats and Issues

- Natural succession has reduced available habitat for this species.
- Bluffland urbanization is becoming increasingly problematic for the prairie-dependent snakes.
- Excessive grazing has degraded habitat for this species and led to the invasion of non-native invasive plants.
- Motorized recreation may be damaging habitats in some areas.
- Road mortality may be an issue in some areas.

**Priority Conservation Actions**

- Long-term protection of habitat supporting several viable populations of prairie ringneck snakes is needed.
- Land management efforts are needed to set back natural succession and maintain prairie habitat.
- Bluffland zoning is needed to protect rare habitats and dependent species.
- Major strides in policy and education are needed to ensure that wildlife habitat is adequately represented and considered in zoning and planning decisions.
- Landowner education is needed to help increase prairie habitat restoration efforts.
- Long-term monitoring is needed to evaluate population status and track trends of representative populations.
- Partnering with prairie restoration groups like the Prairie Enthusiasts will help accomplish habitat management more efficiently.

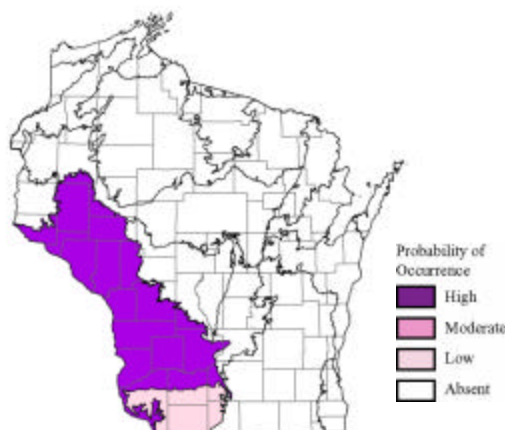


## Black Rat Snake (*Elaphe obsoleta*)

### Species Assessment Scores\*

State rarity:	4
State threats:	3
State population trend:	4
Global abundance:	3
Global distribution:	3
Global threats:	3
Global population trend:	3
Mean Risk Score:	3.3
Area of importance:	2

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Western Coulee and Ridges	Cedar glade
Western Coulee and Ridges	Dry cliff
Western Coulee and Ridges	Dry prairie
Western Coulee and Ridges	Dry-mesic prairie
Western Coulee and Ridges	Floodplain forest
Western Coulee and Ridges	Oak opening
Western Coulee and Ridges	Oak woodland
Western Coulee and Ridges	Pine relict
Western Coulee and Ridges	Southern dry forest
Western Coulee and Ridges	Southern dry-mesic forest
Western Coulee and Ridges	Southern mesic forest

### Threats and Issues

- Development in bluffland areas is a threat to this species.
- Farming has significantly altered or reduced available habitat.
- The lack of habitat management has allowed natural succession to shrink or eliminate essential open-canopy habitat. This is less of an issue for this arboreal species than for the prairie-dependent snakes, but may be a factor specific to den site suitability at the northern edge of its range in Wisconsin.
- Invasive plants may threaten rodent populations in the future if habitat simplification continues on prairies and woodlands (e.g., garlic mustard), thereby limiting snake carrying capacity.
- Road mortality appeared to be a more significant factor historically (30-60 years ago) and may be more limited today due to lower population levels.

**Priority Conservation Actions**

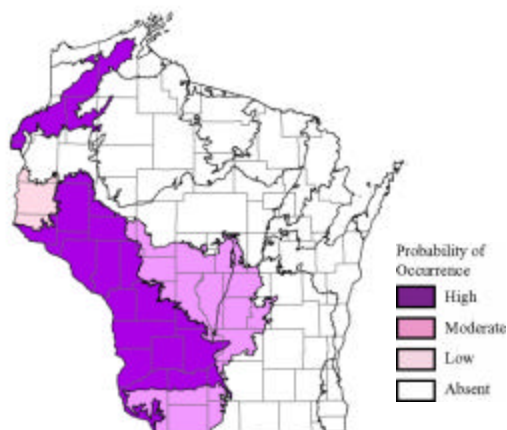
- Reduce woody growth in overwintering habitats (southerly-exposed bluff faces with rock outcroppings that support or supported a prairie understory).
- Continue and increase efforts to control problematic invasives.
- Conduct rare snake workshops for landowners for the five prairie-dependent snakes.
- Solicit the involvement of universities and colleges to accomplish research needs.
- Long term monitoring is needed to evaluate population status and track trends of representative populations.
- Implement a cost share program for bluff prairie restoration and management.
- Partnering with prairie restoration groups like The Prairie Enthusiasts will help accomplish management more efficiently.

## Bullsnake (*Pituophis catenifer sayi*)

### Species Assessment Scores\*

State rarity:	4
State threats:	5
State population trend:	5
Global abundance:	3
Global distribution:	4
Global threats:	4
Global population trend:	4
Mean Risk Score:	4.1
Area of importance:	2

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Central Sand Plains	Dry cliff
Northwest Sands	Pine barrens
Western Coulee and Ridges	Bedrock glade
Western Coulee and Ridges	Cedar glade
Western Coulee and Ridges	Dry cliff
Western Coulee and Ridges	Dry prairie
Western Coulee and Ridges	Dry-mesic prairie
Western Coulee and Ridges	Oak barrens
Western Coulee and Ridges	Oak opening
Western Coulee and Ridges	Oak woodland
Western Coulee and Ridges	Sand prairie

### Threats and Issues

- Habitat loss from conversion of bluffland and sand prairie habitats to agricultural lands and urban and residential development threatens this species.
- Habitat for this species is degraded by the encroachment of red cedar and other woody species into bluff and sand prairies (unchecked natural succession).
- Habitat fragmentation may severely limit long-term population maintenance. Very large tracts of intact habitat (e.g., 2000 to 3000 contiguous acres) are needed to perpetuate populations.
- Mortality from agricultural equipment is a threat to bullsnakes.
- Human persecution is an issue for bullsnakes.
- Over-collecting of bullsnakes for the pet trade has been significant in some areas.
- Spotted knapweed, a non-native invasive plant, has the potential to reduce carrying capacity for bullsnakes through habitat simplification that may impact rodent populations. This appears to be an imminent threat.

- Motorized recreation may damage sensitive prairie and bluffland habitats used by bullsnakes.
- Road mortality from increased roads and associated traffic is an issue for bullsnakes.

**Priority Conservation Actions**

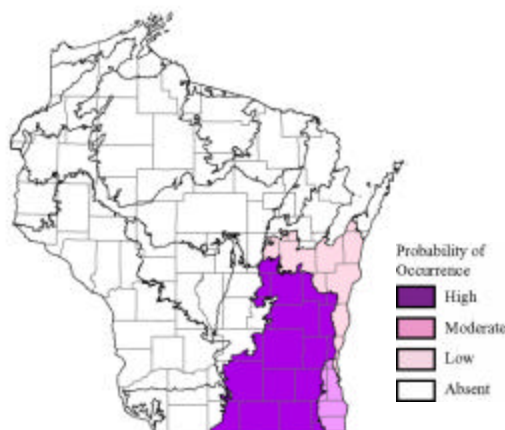
- Acquiring and or protecting additional bluff and sand prairie habitat would benefit this species and others that share this habitat.
- Reversing the negative effects on these species from canopy closure associated with natural succession on public and private land, particularly in bluff habitats where this species was once very abundant, is necessary to help stabilize and recover populations.
- Landowner education is needed to accomplish habitat restoration work on private lands. One avenue for this is through rare snake workshops.
- Long term monitoring is needed to evaluate the status of bullsnakes in Wisconsin and to track trends of representative populations.
- Landowner incentive programs may help promote management of appropriate habitats on private lands. Additional funding for these programs is needed. It is important to link incentive programs to education programs which help inform landowners of the mutual benefits of managing habitats.
- Partnering with prairie restoration groups like The Prairie Enthusiasts will help accomplish land management more efficiently.
- Partnerships with local universities and colleges are needed to conduct needed research and share the associated costs. Presenting research findings at local universities may increase interest in such partnerships, leading to additional research that may benefit the species.

## Queen Snake (*Regina septemvittata*)

### Species Assessment Scores\*

State rarity:	5
State threats:	5
State population trend:	5
Global abundance:	4
Global distribution:	4
Global threats:	4
Global population trend:	3
Mean Risk Score:	4.3
Area of importance:	2

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Central Lake Michigan Coastal	Warmwater rivers
Southeast Glacial Plains	Emergent marsh
Southeast Glacial Plains	Impoundments/Reservoirs
Southeast Glacial Plains	Inland lakes
Southeast Glacial Plains	Shrub-carr
Southeast Glacial Plains	Southern sedge meadow
Southeast Glacial Plains	Submergent marsh
Southeast Glacial Plains	Warmwater rivers
Southeast Glacial Plains	Warmwater streams
Southeast Glacial Plains	Wet prairie
Southern Lake Michigan Coastal	Warmwater streams

### Threats and Issues

- Net impacts of climate change are unclear for this species – they may respond positively to warmer climate, but negatively to drier climate.
- Agricultural runoff and associated siltation and turbidity threaten this species. Siltation has buried a great deal of habitat and smothered the crayfish this species depends on for food.
- The queen snake is a shoreline-dependent species, threatened by loss and degradation of riparian habitats. Clearing of streams to the bank, and natural succession along rivers and streams, has eliminated much of their terrestrial habitat.
- Since it is likely that this species utilizes crayfish burrows for hibernation, reed canary grass, a non-native invasive plant, may limit hibernaculum availability. This may be one of the reasons queen snakes are now using artificial structures as hibernacula in some instances.
- Primary production preempted by invasive species such as zebra mussels could crash crayfish populations.

- Nutrient loading and subsequent eutrophication is suspected to reduce crayfish densities, their primary prey.
- Siltation and pollution from agriculture runoff (manure, fertilizers, and various other chemicals) and roadways (salt, oil) are the two major pollution threats to the occupied stream habitats.
- Loss of hibernacula threatens this species, as the only known sites occur in deteriorating manmade structures (dams, bridge abutments).

**Priority Conservation Actions**

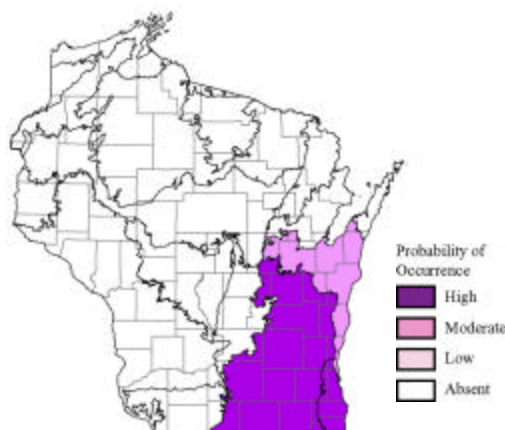
- Permanent protection of riparian habitats that support this species is needed to preserve habitats and increase restoration potential.
- Restoration and management of suitable riparian habitats is needed, including the control of invasive plants.
- Increase protection of lands adjacent to navigable waterways (buffers) to help improve in-stream conditions (improve water quality, clarity, and reduce sediment loading).
- Better regulation of (and incentives for reducing) agricultural runoff is needed to improve aquatic habitat for this species.
- Major strides in policy and education are needed to ensure that wildlife habitat is adequately represented and considered in zoning and planning decisions.
- Increased efforts are needed to educate riparian landowners about the benefits of buffers along waterways.
- Long term monitoring is needed to evaluate population status and track trends of all remaining populations.
- Research is needed into life history and population viability of this species.
- Implement “in perpetuity” riparian protection and enhancement incentive programs.
- Partnerships with local universities and colleges are needed to conduct needed research for this species.
- Continue to support and work with the Natural Resources Conservation Service on projects that protect watersheds and improve stream habitat and water quality.
- Hibernacula in structures must be protected rather than replaced by future construction.

## Butler's Garter Snake (*Thamnophis butleri*)

### Species Assessment Scores\*

State rarity:	4
State threats:	4
State population trend:	4
Global abundance:	2
Global distribution:	5
Global threats:	4
Global population trend:	4
Mean Risk Score:	3.9
Area of importance:	4

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Southeast Glacial Plains	Calcareous fen
Southeast Glacial Plains	Dry-mesic prairie
Southeast Glacial Plains	Emergent marsh
Southeast Glacial Plains	Floodplain forest
Southeast Glacial Plains	Mesic prairie
Southeast Glacial Plains	Northern sedge meadow
Southeast Glacial Plains	Shrub-carr
Southeast Glacial Plains	Southern sedge meadow
Southeast Glacial Plains	Wet prairie
Southeast Glacial Plains	Wet-mesic prairie
Southern Lake Michigan Coastal	Calcareous fen
Southern Lake Michigan Coastal	Emergent marsh
Southern Lake Michigan Coastal	Mesic prairie
Southern Lake Michigan Coastal	Shrub-carr
Southern Lake Michigan Coastal	Southern sedge meadow
Southern Lake Michigan Coastal	Wet prairie
Southern Lake Michigan Coastal	Wet-mesic prairie

### Threats and Issues

- Agriculture and urban sprawl has significantly reduced available upland habitat and has fragmented most remaining Butler's garter snake populations.
- Habitat loss and degradation from recreational development, wetland draining, encroachment, and altered hydrology have negatively affected this species.
- Natural succession is reducing suitable open, upland habitat needed by this species.
- Non-native invasive plants such as reed canary grass and monotypic cattails have significantly decreased habitat suitability.

- Reed canary grass limits or precludes burrowing crayfish, a critical species that provides overwintering habitat for Butler's garter snake.
- Increased run-off results in wetland sedimentation that often alters and degrades native plant communities, favoring monotypic stands of nuisance or exotic species.
- Roads have fragmented habitats and resulted in altered hydrology, negatively impacting this species.
- This species interbreeds with the plains gartersnake. A hybrid zone has significantly reduced the actual range of true Butler's.

**Priority Conservation Actions**

- Protect suitable habitat on significant publicly and privately owned sites to protect remaining habitat.
- Manage habitat connectivity through preservation of connecting corridors.
- Restore habitats by reversing natural succession and reducing densities of nuisance or exotic plants such as reed canary grass.
- Update conservation strategy as guidance for incidental take.
- Evaluate Overlay Zoning as a means of protecting Butler's habitat through municipalities.
- Major strides in policy and education are needed to adequately represent and consider wildlife habitat in zoning and planning decisions.
- Research is needed to determine the role and use of wetland habitats during the snake's active season, to further analyze genetic issues related to Butler's hybrids and plains gartersnakes, and to conduct population viability analyses on representative populations (and obtain information to reduce uncertainty in population parameters for this analysis).
- Establish a long term monitoring program to track trends in Butler's garter snake populations.
- Implement education and landowner contact program to help protect the snake on private lands and build support for the overall conservation strategy for this species.
- There is a need to work proactively with various conservation organizations to permanently protect suitable habitat on significant conservation sites for this species.

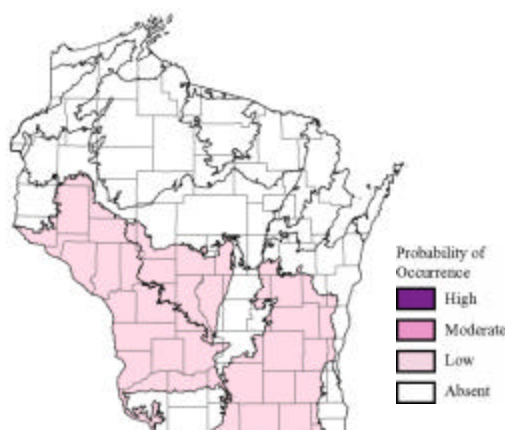


## Western Ribbon Snake (*Thamnophis proximus*)

### Species Assessment Scores\*

State rarity:	5
State threats:	5
State population trend:	3
Global abundance:	2
Global distribution:	3
Global threats:	3
Global population trend:	3
Mean Risk Score:	3.4
Area of importance:	1

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Central Sand Plains	Oak barrens
Central Sand Plains	Shrub-carr
Central Sand Plains	Southern sedge meadow
Southeast Glacial Plains	Dry-mesic prairie
Southeast Glacial Plains	Emergent marsh
Southeast Glacial Plains	Mesic prairie
Southeast Glacial Plains	Shrub-carr
Southeast Glacial Plains	Southern sedge meadow
Southeast Glacial Plains	Wet-mesic prairie
Western Coulee and Ridges	Bedrock glade
Western Coulee and Ridges	Dry-mesic prairie
Western Coulee and Ridges	Emergent marsh
Western Coulee and Ridges	Oak barrens
Western Coulee and Ridges	Shrub-carr
Western Coulee and Ridges	Southern sedge meadow

### Threats and Issues

- Rarity itself is a threat to this species.
- A lack of information on status and distribution of this species hinders conservation efforts.

### Priority Conservation Actions

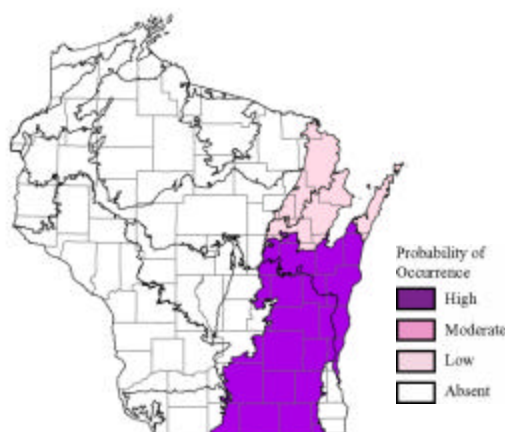
- Permanent protection of occupied sites should be pursued if sites are found.
- Basic inventory work is needed to follow up existing reports and determine if breeding populations exist anywhere in the state. If so, status and trend should be determined and threats identified.

## Northern Ribbon Snake (*Thamnophis sauritus*)

### Species Assessment Scores\*

State rarity:	5
State threats:	5
State population trend:	3
Global abundance:	3
Global distribution:	4
Global threats:	3
Global population trend:	3
Mean Risk Score:	3.7
Area of importance:	2

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Central Lake Michigan Coastal	Alder thicket
Central Lake Michigan Coastal	Bog relict
Central Lake Michigan Coastal	Inland lakes
Central Lake Michigan Coastal	Open bog
Central Lake Michigan Coastal	Shrub-carr
Northeast Sands	Inland lakes
Northeast Sands	Open bog
Northern Lake Michigan Coastal	Inland lakes
Northern Lake Michigan Coastal	Shrub-carr
Southeast Glacial Plains	Alder thicket
Southeast Glacial Plains	Bog relict
Southeast Glacial Plains	Inland lakes
Southeast Glacial Plains	Shrub-carr

### Threats and Issues

- Net impacts of climate change are probably negative for this species, which is 'trapped' in a few isolated wetlands subject to drying and warming.
- This species is especially vulnerable as it is a 'glacial relict,' restricted to a few isolated populations that should be protected from future threats.
- Degradation and loss of habitat from development, agriculture, hydrologic impacts, and recreation threaten this species.
- Non-native invasive plants such as reed canary grass and giant reed grass negatively affect shoreline habitat suitability for this species.
- Wetland habitats are suffering from a variety of pollution problems including mercury, acid rain, salt, nutrient loads, siltation, and (where motorized traffic is heavy) fossil fuel spillage. These threats may affect both ribbon snakes and their prey base (frogs).

- Roads near known populations can reduce habitat and contribute to road mortality.

**Priority Conservation Actions**

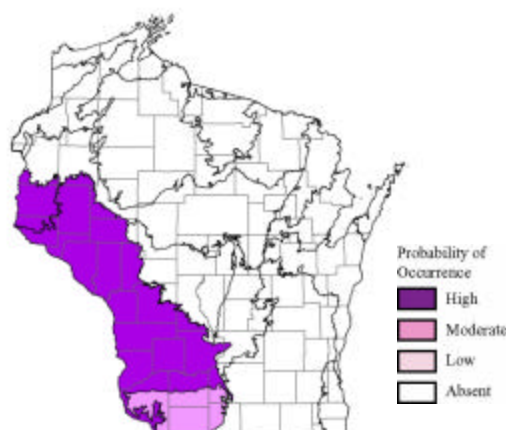
- Permanent protection of the two known occupied sites (with sufficient buffers) is paramount.
- The protection of all occupied habitats is perhaps the only thing we can do to perpetuate this species. This includes protection of hydrology and management to control natural succession.
- Major strides in policy and education efforts are needed to ensure that wildlife habitat is adequately represented and considered in zoning and planning decisions.
- Surveys of bogs in southern and northeastern Wisconsin are needed to better document the range and status of this species.
- Long-term monitoring of the two known populations is needed to track trends.
- Roads near known populations should not be expanded in a manner that would reduce habitat size or quality, or increase road mortality, for this species.

## Timber Rattlesnake (*Crotalus horridus*)

### Species Assessment Scores\*

State rarity:	4
State threats:	4
State population trend:	4
Global abundance:	4
Global distribution:	3
Global threats:	4
Global population trend:	4
Mean Risk Score:	3.9
Area of importance:	3

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

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### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Southwest Savanna	Dry prairie
Western Coulee and Ridges	Cedar glade
Western Coulee and Ridges	Dry cliff
Western Coulee and Ridges	Dry prairie
Western Coulee and Ridges	Oak opening
Western Coulee and Ridges	Oak woodland
Western Coulee and Ridges	Pine relict
Western Coulee and Ridges	Sand prairie
Western Coulee and Ridges	Southern dry forest
Western Coulee and Ridges	Southern dry-mesic forest
Western Coulee and Ridges	Southern mesic forest

### Threats and Issues

- Quarry operations destroy dens and result in direct mortality of this species.
- Natural succession of goat prairies, especially those with exposed limestone rock outcroppings, reduces habitat for this species.
- Agricultural equipment-related mortality, especially haying in late summer.
- Development of bluffland areas threatens this species.
- Bounties used in the past and other eradication efforts, including illegal collecting for pet trade and artifacts, and human persecution threaten this species.
- Habitat degradation from red cedar invasion of goat prairies threatens this species.
- Increased road building to accommodate urban sprawl leads to more road mortality, especially where there are dens nearby.

**Priority Conservation Actions**

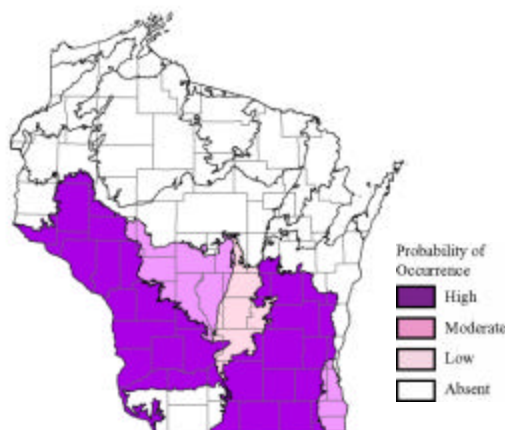
- Closing denning areas to public access on public lands may reduce poaching.
- Permanent protection of remaining viable dens and associated summer range habitat is needed.
- Habitat management is needed to reverse negative effects of natural succession on den and nursery areas and bluff prairie habitat in general.
- Bluffland zoning regulations are needed to protect rare habitats and dependent species.
- Major strides in policy and education are needed to ensure that wildlife habitat is adequately represented and considered in zoning and planning decisions.
- Landowner education is needed to help increase prairie habitat restoration efforts on private lands.
- Partnerships with universities and colleges are needed to accomplish research needs, including expanded radio telemetry studies to advance understanding of summer range needs and to determine the impacts of fragmentation and natural succession of disturbed den populations and compare these to intact sites.
- Long term monitoring is needed to evaluate population status and track trends of representative populations.
- Partnering with prairie restoration groups like The Prairie Enthusiasts will help accomplish land management more efficiently.

## Eastern Massasauga Rattlesnake (*Sistrurus catenatus catenatus*)

### Species Assessment Scores\*

State rarity:	5
State threats:	5
State population trend:	5
Global abundance:	4
Global distribution:	5
Global threats:	4
Global population trend:	5
Mean Risk Score:	4.7
Area of importance:	2

\* Please see the [Description of Vertebrate Species Summaries \(Section 3.1.1\)](#) for definitions of criteria and scores.



### Ecological Landscape Associations

Please note that this is not a range map. Shading does not imply that the species is present throughout the Landscape, but represents the probability that the species occurs somewhere in the Landscape.

### Landscape-community Combinations of Highest Ecological Priority

Ecological Landscape	Community
Southeast Glacial Plains	Calcareous fen
Southeast Glacial Plains	Dry prairie
Southeast Glacial Plains	Dry-mesic prairie
Southeast Glacial Plains	Emergent marsh
Southeast Glacial Plains	Floodplain forest
Southeast Glacial Plains	Mesic prairie
Southeast Glacial Plains	Shrub-carr
Southeast Glacial Plains	Southern sedge meadow
Southeast Glacial Plains	Wet-mesic prairie
Western Coulee and Ridges	Dry prairie
Western Coulee and Ridges	Dry-mesic prairie
Western Coulee and Ridges	Emergent marsh
Western Coulee and Ridges	Floodplain forest
Western Coulee and Ridges	Oak barrens
Western Coulee and Ridges	Sand prairie
Western Coulee and Ridges	Shrub-carr

### Threats and Issues

- Net impacts of climate change are unclear for this species.
- Habitat loss and degradation from the conversion of suitable upland habitat to agricultural land and from natural succession of open-canopy wetlands to closed canopy conditions limits suitable habitat for this species.
- Harvesting of marsh hay has contributed to significant snake mortality.
- Impounding of suitable wet meadow/sedge meadow habitats eliminated essential habitat. Drawdown management of these systems during massasauga overwintering appears to have contributed to their decline (e.g., in Dike 17).

- Potential hydrologic changes resulting from land use and dams on the Mississippi, Black, and Chippewa Rivers are a threat to this species.
- Illegal harvest is still a threat to Eastern massasauga rattlesnakes. Poaching of this species for pets has been observed as recently as 2001.
- Habitat degradation and alteration from non-native invasive plants threatens this species. Reed canary grass (and probably giant reed grass as well) reduces the carrying capacity of burrowing crayfish. These crayfish provide the primary overwintering burrows for this snake. Seasonal use by Eastern massasauga rattlesnakes of reed canary-dominated areas is also much lower than that of areas with native wetland vegetation.
- Roadsides, railroad corridors, and utility line corridors through massasauga habitat were heavily hunted by bounty hunters, contributing to the decline of the species. Persecution of this species continues at a very low level, primarily because this animal is nearly extirpated in Wisconsin.
- Roads contribute to habitat fragmentation and road mortality.

#### **Priority Conservation Actions**

- Extant populations of Eastern massasauga rattlesnakes exist on either state or federal lands or within state or federal project area boundaries. Efforts are needed to permanently protect habitat on remaining private lands in these areas, particularly for the Lower Black River and Turtle Lake/Creek projects.
- Management is needed on both the Black and Chippewa Bottoms to reverse the effects of natural succession by restoring open canopy conditions. This work has begun at Tiffany Wildlife Area but needs to occur at Van Loon Wildlife Area as well.
- Habitat restoration is needed at sites from which the species has been extirpated but which might support viable populations in the future (e.g., Turtle Valley).
- Reintroductions are needed at extirpated or nearly extirpated sites where ample suitable habitat exists to support a population (e.g., Yellow River/Turtle Creek).
- Wisconsin DNR policy is needed regarding reintroduction efforts for this species.
- The state Endangered Species Act needs amending to better protect habitat of listed species.
- Strides are needed in policy and education efforts to better represent and consider wildlife habitat in zoning and planning decisions.
- Landowner, general public, and legislature education is needed in order to obtain support for potential reintroduction efforts. Education may also assist in gaining permanent or long term protection (possibly through conservation easements) of occupied sites on private lands.
- Additional research is needed to evaluate repatriation as a conservation strategy.
- Long term monitoring is needed to evaluate population status and track trends of all extant populations.
- Continue to work with the U.S. Fish and Wildlife Service on completion of Candidate Conservation Agreements for the eastern massasauga rattlesnake on the lower Chippewa and Black River Bottoms.